Ciba Specialty Chemicals

Coating Effects

Ciba® IRGACURE® PAG103

Photoacid-Generator (PAG)

General

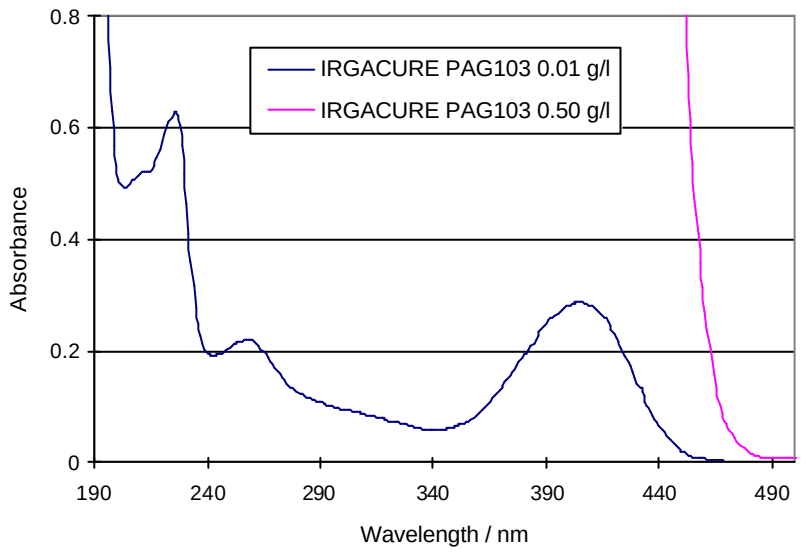
IRGACURE PAG103 is a highly efficient non-ionic photoacid-generator liberating propane-sulfonic acid when exposed to light in a fairly wide spectral range from the Deep-UV-area up to more than 450 nm. Products of similar chemistry but liberating other acids are available in the IRGACURE PAG1xx-series: IRGACURE PAG108 (octane sulfonic acid) and IRGACURE PAG121 (toluene sulfonic acid).

Features and benefits of IRGACURE® PAG 103:

- Halogen-free
- Non ionic
- High sensitivity at g-, h-, i-lines and 248nm (KrF excimer) sources
- Good thermal stability (<140°C)
- High solubility
- Low volatility

Absorption Spectrum

(% in Acetonitrile)



UV absorbance: (0.001 wt/v % in acetonitrile at 25 °C)

248 nm	0.214
365 nm	0.113
405 nm	0.295
436 nm	0.097

Physical Properties

(typical values)

Appearance:	yellow solid
Thermal Decomposition:	>140 ^{0}C (determined by DSC) in polyhydroxystyrene matrix

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Melting Point:	93-95 °C

Solubility at 25°C (g/100 g solution):

PGMEA (propylene glycol monomethyl ether acetate)	>20
Ethyl lactate	>14

Applications

IRGACURE PAG103 may be used, after adequate testing in the following applications:

Imaging: Photoactive compound in:

a.) positive photoresists based on photochemical acid generation, such as chemically amplified photoresists, containing acid labile functional groups which - after reaction with the photo-generated acid - enhance the solubility of the resist material in an alkaline developer (i.e. chemically amplified positive resists comprising phenolic and/or acrylic (co-) polymers and acid labile functions such as t-butylesters, t-butylcarbonates, acetals, ketals, silyl ethers, etc.);

b.) negative photoresists based on acid induced reactions (i.e. electrophilic substitution or crosslinking) which change the solubility of the exposed resist material in a developer.

c.) photoimaging materials (for example, such as a) and b)) for manufacturing semiconductor devices, like electronic circuits, thin film transistors for LCD, galvano- and plating masks, ion implantation masks, etch resists, printing plates, protective coatings, holograms, etc.

d.) UV-photoimaging, including deep-UV and near UV radiation sources, particularly from 190 nm to 450 nm wavelength and preferably at mercury i-line (365 nm), h-line (405 nm) and g-line (436 nm) , with lasers, mercury-, metal-halogenide and excimer lamps, through photomasks or by direct write techniques.

Coatings and others: Photoactive component in:

a.) Radiation cured coatings based on acid hardening systems with wide photosensitivity spectrum from deep-UV to about 450 nm;

b.) Color change system based on reaction of a component with acid in the exposed areas and sensitive through the whole UV range.

Concrete examples how to use the PAG in resist formulations are given in the following:

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Example of Positive Tone Resist (t-BOC type)

Binder polymer:	poly(HS-co-t-BOC HS*)	100 solid parts
PAG	IRGACURE PAG103	4 solid parts
Solvent:	PGMEA	

* HS = p-hydroxystyrene, Mw 11900, Mw/Mn=1.10, 40% t-BOC-protected

Sensitivity

PAG	Sensitivity E_0 (mJ/cm^2) 254 nm	Dark Erosion (nm/s)
IRGACURE PAG103	17	< 0.1

Example of Negative Tone Resist

Binder polymer:	poly(p-hydroxystyrene)	65 solid parts
Crosslinker:	melamine resin (hexamethoxymethyl melamine)	30 solid parts
PAG	IRGACURE PAG103	5 solid parts
Solvent:	PGMEA	

Sensitivity

PAG	Sensitivity: E_1(mJ/cm^2)	
	365 nm	436 nm
IRGACURE PAG103	18	11

Safety and Handling

IRGACURE PAG103 should be handled in accordance with good industrial practice and in conformity with any legal regulations. Detailed information is provided in the Safety Data Sheet. The information contained herein is based on the present state of our knowledge and is intended to describe our products from the point of view of safety requirements. It should not be construed as guaranteeing specific properties.

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IRGACURE PAG103 **is very sensitive to visible light and should be handled under yellow light conditions.** Opened drums should be closed after use to protect the product against light. Storage in a refrigerator at 3-6^{0}C is recommended.

Important Notice

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